



UNIVERSITY OF
BIRMINGHAM



Birmingham Institute
for Sustainability
and Climate Action

Housing, Health and Extreme Events Conference 8-10th April 2025

Summary Report of findings for COP 30

02.09.25

Key conference findings:

- 1. Professional responses to extreme events are siloed and fragmented in the fields of academia, government and policy making.**
- 2. Evidence that upstream investment in healthy housing saves downstream health costs is rarely factored in by policy makers.**
- 3. Lessons learned from previous emergency events are often not implemented.**
- 4. The global south is often viewed by high income countries primarily as a recipient of top-down assistance, not respected for its indigenous knowledge.**
- 5. Groups low in power hierarchies in all countries are under-represented in decision making for emergency event preparedness and resilience.**
- 6. Colonisation and mass urbanisation created a legacy of housing poorly adapted to climate change.**
- 7. 'Temporary' housing is often, effectively, permanent. Too often it is unhealthy and culturally insensitive.**

Top-level recommendations:

- 1. Horizontal and vertical communication should be fostered between professional disciplines and national and local government services.**
- 2. Health should be better integrated as a cross-cutting theme of planning.**
- 3. Lessons should be learned from previous emergency events and shared.**
- 4. International 'equal status' communication and knowledge sharing should be facilitated.**
- 5. Marginalised and under-represented groups should participate in decision making.**
- 6. Traditional, indigenous design (or modern design adopting its materials and principles) is the most in tune with nature and biodiversity and favourable to climate change.**
- 7. Technological solutions on affordable and healthy post-emergency event housing and solutions for potable water, sanitation and safe food storage, often developed in universities, should be shared.**

1. Introduction and Background

The Housing, Health and Extreme Events online conference which took place from the 8-10th April 2005, was organised by the Healthier Housing Partnership (a small UK based voluntary group of housing academics and professionals), supported by the Birmingham Institute for Sustainability and Climate Action at the University of Birmingham.

The idea for the conference emerged from a knowledge gap relating to the research and case evidence related to how we are building resilience to extreme events, importantly linked to protecting and promoting people's health and wellbeing as part of this. Events focussed on included extreme weather events such as heatwaves, droughts, wildfires, tropical cyclones, tornadoes and flooding as well as events such as earthquakes. In discussion with the International Advisory Group, a decision was taken not to have a specific focus on war for this event, due to the magnitude of issues that would be generated and the time needed for proper consideration. However, related issues of displacement linked to internal conflict were considered during the proceedings.

2. Aim of conference

Extreme events are occurring with more frequency and greater intensity, partly fuelled by climate change. The conference aimed to provide a platform to review and discuss the experience of extreme events and focus on the health aspects of housing and communities in terms of resilience.

In particular, the conference focused on preparedness, response and recovery, including adapting existing housing stock to make it more resilient to issues such as optimising housing for displaced people. The key messages from each of the speakers are detailed later in this summary report. It was anticipated that the findings from this conference would be used to influence policy

3. International Advisory Group

The conference was steered by an International Advisory group which met every 2-3 months on the run up to the conference. The membership of the International Advisory Group, together with the local Steering Committee can be found in **Appendix 1**.

4. Sponsorship

The event was sponsored by several organisations, including Routledge, The UK Health Security Agency, the University of Birmingham, Biovitae and UL Research Institute/Chemical Insights (a full list is provided in **Appendix 2**). The Healthier Housing Partnership are extremely grateful to their sponsors, without which this event would not have been possible.

It is also worth noting the huge 'in kind' contribution from members of the Healthier Housing Partnership Steering Committee, the International Advisory Group and contributors to the conference proceedings.

5. Speakers and attendees

The conference attracted 31 speakers, including leading academics, heads of national organisations and community representatives from across the globe. The list of speakers and their organisations can be found in **Appendix 3** of this report. Of note is the number of countries involved with the conference, spanning the continents of Africa, Asia, Oceania, America and Europe. The conference was attended by over 140 people from various backgrounds and countries with extremely positive feedback around the need for further international events of this type to share learning.

Keynote sessions were delivered on day 1 and day 3 of the conference, with five parallel sessions on day 2 focussing on the following:

- 1 Immediate/Urgent Responses (including issues of preparedness for first responses, shelter, medical care, food and water for example)
- 2 Temporary Stabilising/Short Term Responses (including accommodation, infrastructure, personal health and social support, environmental health and planning for services)
- 3 Medium Term Responses (including planning for reconstructing housing, homes, neighbourhoods, and communities)
- 4 Longer term Responses (including longer term rebuilding and reconstruction of housing and physical and social infrastructure)
- 5 Preventing and Preparing for extreme events (including planning for and developing resilience to extreme events)

6. Submitted Papers

12 papers were submitted to the conference which were of high quality. A list of the submitted papers can be found in **Appendix 4**. The papers were judged by a small international panel with one winning paper and three highly commended papers submitted by Dr Mike Agenbag from Cape Peninsula University of Technology (winning paper), Dr Ang Li from the University of Melbourne, Dr Jamila Zanna from University of Birmingham and Dr Cyril Effiong from the University of Birmingham (all highly commended papers).

Routledge generously sponsored a prize of £200 worth of books for the winner and certificates for the highly commended papers.

7. Routledge Publication

A book capturing conference papers and findings is under consideration. A number of further events have also been identified where the findings can be shared.

Summary of key messages and recommendations from individual conference presenters

Day 1 – setting the context

1. Prof. David Hannah, UNESCO Chair of Water Science, Director of Birmingham Institute for Sustainability and Climate Action – **Opens conference with context setting**

Key Messages:

- Need for research with impact
- Understanding barriers to adaptation & developing solutions
- Advancing technologies & policies that enhance resilience
- Strengthening capacity to navigate uncertainty & respond effectively
- Examining the interconnectedness of climate change, environmental sustainability, & human health

Recommendations:

- Further collaboration with policymakers, practitioners, & communities ensures that research informs real-world adaptation strategies & contributes to equitable, sustainable futures
- Addressing these challenges through interdisciplinary collaboration, with an emphasis on evidence-based policy & practical solutions for climate-resilient health systems

2. Dr David Jacobs, Chief Scientist, US National Center for Healthy Housing

The need for multifactoral approaches to disaster management

- Current fragmentation of specialists linked to extreme events, health and housing, into siloed domains
- Proactive planning essential - Need for shared vision and a 'health in all policy' approach
- Need to re-imagine healthy housing in the time of climate change

Recommendations:

- New effort required around training, co-ordination of Govt. physical and mental healthcare systems
- Recognising and enforcing healthy housing, environment and energy standards
- Disaster recovery brings opportunities to create healthier, more resilient and sustainable communities
- Engagement with community as part of recovery to ensure their needs are met as part of build back, including issues such as affordability

3. Dr Nathalie Roebbel, Lead on Urban Health, World Health Organization

Extreme events and their impacts on housing, health and communities

- Heat stress – leading cause of weather-related deaths
- Housing determines health and *health equity*
- Trauma from flooding – deaths not only from drowning but also from related electrocution, fires etc.
- Wildfires - impact on the environment, property, livestock and human mortality and morbidity and on key workers tackling them

Recommendations:

- Need for urban planning, design and architecture to combat heat (with examples given) including WHO guidance on Urban planning for resilience and health
- Action areas identified for building local resilience to health (figure 1):

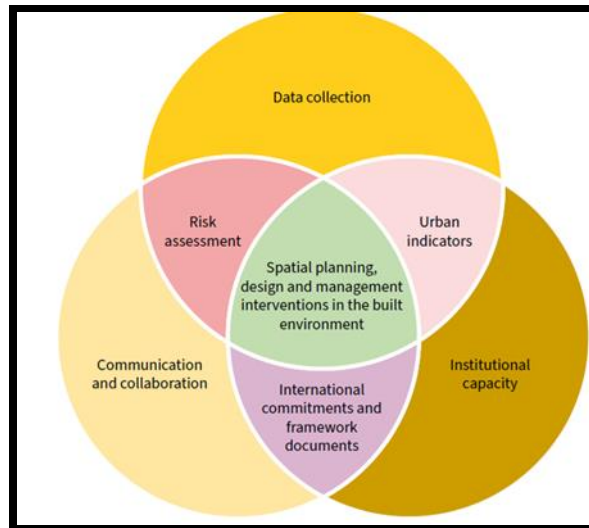


Figure 1 – Action areas identified for building resilience to health

- Crisis management should be evaluated to keep learning, improving and planning more resilient, sustainable and healthy urban environments.
- Local access to basic services should be ensured through equitable distribution and proximity lifestyle paradigms
- Health should be better integrated as a cross-cutting element of urban planning

4. Prof Paloma Taltavull de la Paz, Department of Applied Economics, University of Alicante.
The Valencia Flooding in 2024. Reasons, impacts, resiliency and lessons learned

- IDHL (Isolated Depression at High Levels or DANA) struck the Valencian Community with extraordinary force, causing one of the worst natural disasters in Spain's recent history
- Five rivers overflowed: Turia, Magro, barranc de Picassent, barranc de Poio, i barranc de la Saleta
- Scale of destruction – 235 human loss, 36572 rescued, motorways and transport out of action isolating communities, no energy (3 days), lack of water (10 days), Lack of gas (1+month), lack of food (3 weeks to 4 months) plus lack of access to medication
- Long term impacts also considered – loss of belongings and housing infrastructure (77,000 houses affected), 40% of factories lost specialist machinery, re, location of business's, exports, disruption of logistics chains.
- Economic consequences – estimated 20584 million euros credit (loans etc) for residents in the affected zone
- Impacts on other areas linked to zone affected
- The loss of tangible and intangible heritage elements threatens the continuity of local cultural traditions

Recommendations:

- Key need for resilience in terms of power sources – independent/green sources of power = ability to make food, connect etc in immediate aftermath

- New community solidarity networks (to share resources, digital platforms and mutual aid and social reconstruction)
 - Learn from mistakes, in particular the time for Public Authorities to respond.
5. Dr Michael Agenbag, Senior Lecturer/Community Service Co-ordinator (Environmental Health), Cape Peninsula University of Technology

Psychological bias and fragmentation in extreme event management

- Despite advances in risk management and emergency responses, the gap between what is known, and subsequent responses remains asymmetrical
- Decisionmakers often delay taking preventive measures due to how they perceive risks.
- Urgent need for better preventive action requires unpopular decisions and actions (Example – Ontinyent – Spain).
- Luhmann’s organisational theory -Organisations are decision-making machines that maintain status quo – cannot expect leadership to prioritise prevention out of their free will.
- Construal Level Theory (CLT) - Decision-makers abstractly view distant events with a causal delay, not prioritising them over immediate issues.
- Easton’s political systems theory - ‘Black Box’ – opaque space and ‘noise’ into action

Recommendations:

- Extreme events present unique opportunity to address psychological biases that impede preventive action (linked to figure 2 below)
- Leveraging organisational and political theories and incorporating preventive KPIs and multi-sectoral collaboration – creates opportunities to bridge the gap between policy and practice in disaster management.
- Overcoming psychological biases requires shift in how risks are perceived.
- Systemic changes are required in how organisations and political systems operate.
- Integrate prevention into the fabric of decision-making.

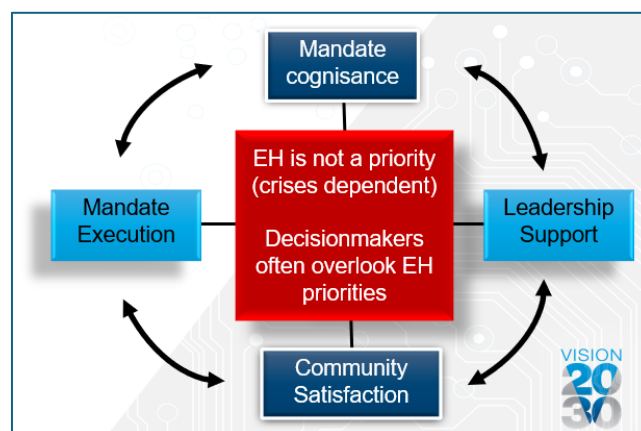


Figure 2 - Fundamentals of effective service delivery

Day 2, session A – Immediate/Urgent Responses

1. Learning from Ex-cyclone Ellie and flooding in Kimberley, Western Australia, 2023

Catherine Feeney, Project Lead – Western Australia Local Government Arrangement) (WALGA) and Wayne Neate, Director of Infrastructure, West Kimberley, Australia

- Ex TC Ellie was a tropical cyclone briefly, but caused heavy rain and flooding in the Northern Territory and Kimberley for two weeks. The storm resulted in significant rainfall and widespread flooding.
- The river in Fitzroy Crossing peaked at 1.86m above highest ever previously recorded flood levels which were set in 2002 and at its widest point it was over 50km in width. One seconds flow was equal to the volume of Sydney Harbour.
- Immediate issues - Access to road networks, Water supply – both private and Commercial, Wastewater – both private and commercial
- Public Health considerations included deceased animals, heat and fatigue, dehydration, mosquito activity plus mud and alligators.
- Community led recovery - Consisted of local Aboriginal leaders representing five impacted language groups, along with community members and business representatives.
- Building back better – community resilience, empowerment through education, accessibility of resources, establishing strong support networks, accommodation needs set out in phases.

Recommendations:

- Respecting Community Values - Culturally sensitive approaches, prioritise the values and traditions of affected communities, fostering mutual respect
- Building Trust -By respecting cultural sensitivities, recovery efforts can build trust between organisations and affected communities, ensuring better cooperation.
- Enhancing Recovery Effectiveness - Culturally sensitive recovery initiatives are more effective as they align with the community's needs and expectations. Community involvement is essential for effective recovery efforts, fostering collaboration and support among residents.
- Be nimble and adapt quickly to whatever is presented

2. Central Sulawesi earthquake and tsunami, Indonesia, 2018 – community resilience and empowerment

Dr Surindar Dhesi and Muhammad Nasir, University of Birmingham and University of Georgia

- September 2018 - Earthquake (7.5 Mw), Liquefactions (4-7 meters), Tsunami, Landslide
- Affected Areas: Palu, Sigi, Donggala, Parigi Moutong
- 172,635 IDPs, 3,673 deaths, +/- 5000 missing, 4,438 seriously injured, 99,726 destroyed houses, destroyed public facilities
- The study aimed to examine the living conditions of disaster-affected communities from an environmental health perspective, focusing on housing, food safety, and sanitation (WASH). Moreover, the study also explored

community resilience, community empowerment, and post-disaster management systems

- Found 'top down' approach not working – issues of Hierarchy and power, lack of agency and Community participation, lack of Community empowerment and involvement and mistrust of Government
- Community resilience – Found there was a struggle to find employment/ livelihood and no stable income. People prefer education, employment and training instead of direct aid plus strong sense of togetherness and social capital with respect to developing conflict-solving mechanism
- Issues of conflict, violence and security related to shelters discussed plus medicine and health.

Recommendation:

- Temporary shelters should meet basic environmental health standards to protect the health of displaced people. Community engagement and empowerment is essential in the decision-making process to ensure that needs are identified and met.

3. Local, affordable and well-adapted design in informal settlements

Regina Opondo DARAJA, Resurgence, Kenya and Tanzania

- Kounkuey Design Initiative is a (nfp) partner with under resourced communities to advance equity and activate the unrealized potential in neighbourhoods and cities
- Team consisting of urban planners, civil engineer, urban designer, researchers, architect, landscape architects, construction, community organisers, gender expert, accountants, operations and enumerators
- Key activities - Baseline / endline research & data analysis, impact based forecast & early warning products, information, ecosystem mapping & feedback Loop, community preparedness, response action and plans (RAPS)
- Research through household Surveys, interviews, focus Group Discussions and information ecosystem mapping (IEM) informed the design of the DARAJA pilot services.
- Mapped out actors across the system including National Meteorological Agency, Red Cross, National Disaster Agency, Community Development Organisations.
- From their work 93% respondents now access or receive weather and climate information compared with 56% of respondents in the baseline.
- Loss avoidance - 76% felt the actions they took saved their household income. 76% felt they were able to protect their assets and valuables, most commonly their clothing, radio, TV, bed, food, food and furniture.

Recommendation:

- Impact of investment - The DARAJA Service piloted in Nairobi and Dar es Salaam achieved strong impact results during 2018-2020: These included up to a 20:1 benefit cost ratio (BCR) in enhanced productivity and avoided climate related damage and loss to users. Since its launch in September 2018,

DARAJA has provided nearly 1 million people in Kenya and Tanzania with improved weather information.

4. The Chile wildfires of 2024, role of the health emergency operations centre as a public health tool

Guido Martinez Emergency and Climate Change Coordinator, Ministry of Health, Chile and Cárcamo, A Gútiérrez, Ministerial Secretary of Health Biobio Region

- Chile wildfires - Between 1964 and 2024, the wildfire seasons of 2016, 2017, 2022, and 2023 recorded the highest number of hectares burned nationwide. From 2014 to 2024, the Biobío Region ranked first in burned areas nationwide. During this period, more than 369,000 hectares were affected by wildfires in the region, equivalent to approximately 15% of its total area.
- The training of Rapid Response teams and the establishment of the Health Emergency Operations Center began in 2012 under the Regional Ministerial Secretariat of Health of the Biobío Region (Health Authority). To date, more than 250 Health Authority officials have been trained. Annual training includes 24 hours of instruction, along with simulation and drill exercises. Approximately US\$ 31,500 has been invested in regional training activities.
- In 2023, wildfires burned 181,796 hectares in the Biobío Region—7.8 times more than the previous year and 325% above the average burned area for the 2014–2023 decade.
- As of March 21st, 2023, approximately 134 wildfires had occurred in the Biobío Region: 1,773 homes destroyed (70% of all homes lost nationwide). 6,048 people affected (77% of the total affected population nationwide). Tragically, 17 fatalities were recorded, accounting for 65% of wildfire-related deaths nationwide.
- The Health Emergency Operations Center (HEOC) was established by the Regional Ministerial Secretariat of Health in the Biobío Region on February 3rd. The HEOC operates under a three-tier command structure. It collects and consolidates information from various technical areas, generates periodic reports, and identifies priority areas. The HEOC is a dedicated physical space designed to manage prolonged emergencies or health risks, including outbreaks, epidemics, and natural or humanmade disasters.
- Emergency Health strategies – Rapid response Teams, emergency medical Teams, and specialized mental health and ophthalmological care units were deployed to assist affected communities.
- Public Health strategies - A total of 346 health inspections were conducted in the region, primarily to verify sanitary conditions. The main focus areas included: shelters, drinking water supply, proper sewage disposal, waste management, food safety, nursing homes, ensuring anti-tetanus vaccinations, psychological first aid, distribution of hygiene and personal care items.

Recommendations:

- It is essential for the health sector to have well-trained teams prepared for emergency and disaster response, as this contributes to a swift and effective reaction.
- The establishment and implementation of a Health Emergency Operations Centre (HEOC) help to better organize the response to major disasters and prioritize different needs to effectively protect the health of populations affected by wildfires.
- Due to these changes, during the wildfires, the healthcare network remained operational, with ongoing monitoring by the HEOC and continuous coordination and communication with the Emergency Managers of the region's four Health Services. The only exception was the rural health post in the locality of Cónico, Santa Juana, which was completely destroyed. It has now been fully rebuilt.

Day 2, session B – Temporary stabilising

5. **Unmet needs of the internally displaced population in Nigeria - stabilising lives in the aftermath through intermediate accommodation and support**

Dr Jamila Wakawa Zanna, University of Birmingham

- Nigeria has approximately 3.4 million internally displaced persons (IDPs) due to conflict and natural disasters. Displaced women and older adults face compounded health and housing challenges
- Study was a phenomenological approach to understanding lived experiences and environmental health challenges, utilising interviews and focus groups with affected adults
- Key challenges described by population - Overcrowded and Temporary Housing: poor ventilation and exposure to adverse weather conditions, sanitation and Hygiene, limited access to toilets leading to open defecation. Improper waste disposal leading to environmental contamination, pest Infestation with rodent and insect infestations worsening living conditions and mental stress
- Gender and age specific vulnerabilities – Women at heightened risks of harassment and gender-based violence due to shared sanitation facilities. Older Adults with limited mobility have additional challenges in accessing clean water, nutrition, and healthcare. Compounded risks due to gender, age, insecurity and social Marginalisation
- Health Impacts and wellbeing - Physical -Waterborne diseases due to contaminated water sources. Respiratory issues due to overcrowded and poorly ventilated shelters. Mental Health - Psychological stress from insecure living conditions and social isolation. Environmental Health Nexus - Direct link between housing conditions and health outcomes in displacement settings.
- Community resilience and adaptive strategies - Grassroots initiatives for waste management and hygiene maintenance. Women-led hygiene campaigns reducing disease prevalence. Informal pest control and environmental management practices. Local knowledge and community agency play vital roles in stabilisation. Informal pest control and environmental management practices

Recommendations:

- Sustainable transitional housing - Climate resilient durable shelter to bridge emergency and long-term housing
- Improved sanitation and waste management - Gender-sensitive facilities, drainage systems and solid waste disposal
- Expanded healthcare access - Mobile health units, mental health support and outreach services
- Stronger protection measures - Addressing GBV risks, ensuring legal rights and provision for safe integration into urban planning Community-led solution.
- Empowering displaced populations in decision-making and self-sufficiency initiatives

6. **Housing trajectories following extreme events and people with mental illness**

Drs Ang Li and Rebecca Bentley, NHMRC Centre of Research and Excellence in Healthy Housing, University of Melbourne

- Study aims - Long-term effects of extreme climate events on mental health for individuals with and without pre-existing mental health conditions 2) Long-term effects of extreme climate events on housing (affordability, security and condition) for individuals with and without pre-existing mental health conditions 3) How housing determines mental health trajectories.
- Longitudinal study including 11,000 people including those who had been exposed to a climate related disaster.
- Extreme weather events were associated with greater psychological distress among individuals with mental illness compared to those without.
- The mental health effects were significantly worsened when individuals with mental illness experienced housing payment arrears and residential instability during disasters.

Recommendations:

- Findings suggest that housing-based support focused on providing stable housing and financial assistance to sustain housing during disaster recovery could be crucial components of mental health interventions for disaster-affected individuals with mental illness.
- The intersection between disaster exposure, housing vulnerability, and mental health highlights important pathways through which disasters can have indirect impacts on health.

7. **UKHSA adverse weather and health plan**

Paul Coleman, UKHSA Extreme Events and Health Protection Unit

- Plan is an Important component of the Centre for Climate Change and Health Security's response to immediate impacts of extreme weather
- Aims to alleviate the impacts of extreme weather on human health, as highlighted in UKHSA's Health Effects of Climate Change in the UK report.
- Key Findings - Health Impacts: Increased mortality, ambulance calls & lower wellbeing at high indoor temperatures. Some studies suggest thresholds

between 17°C - 31°C. Few studies link direct temperature measurements to severe health outcomes

- Gaps in Evidence: Limited UK-specific data & workplace studies, challenges in setting fixed maximum thresholds due to varying risks, need for more research on vulnerable groups & workplace safety
- Expert consensus workshop findings: A single fixed temperature limit is not suitable due to variations in individual heat responses, heat stress indices should be simplified into risk categories (e.g., 1-5), while older adults are generally more vulnerable to heat, there is significant variation in their health and activity levels, care homes may have limited options for cooling due to infection control, building design, and airflow restrictions. There is limited research on how heat affects those with mental health conditions or neurological disorders in care settings. There is no consensus on what heat mitigation strategies should aim to prevent (e.g., discomfort, dehydration, cardiovascular issues, or mortality). Need to consider successful heat resilience strategies from other countries to improve care home policies.

Recommendation:

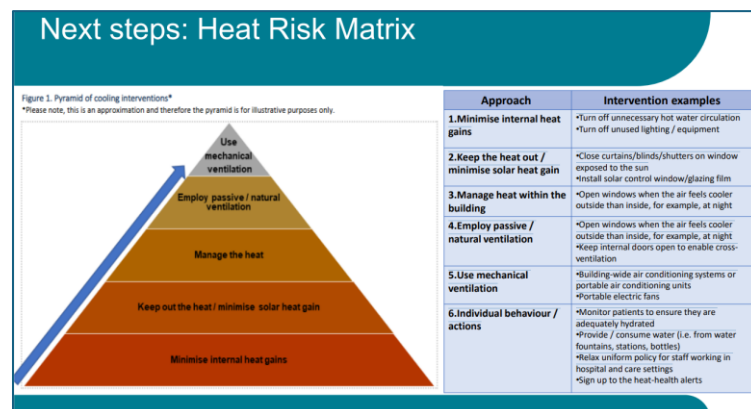


Figure 3 – Heat Risk Matrix

8. Lessons from community-led adaption to extreme weather events to protect health

Dr Lee Towers School of Social Science Teesside University and Dr Anna Cronin de Chavaz, Exeter University

- Exploring community led responses to climate related weather extremes, mix of cases in urban and rural context, focus on health, wellbeing and injustice.
- Emergent themes – shifting vulnerabilities, benefits of green/blue space (and inequity of access), funding prescribing what and how things are done and impact of austerity and competition for funds.

Recommendations:

- Building trust and connections in the communities is valuable
- Time spent looking for funds – Austerity works for only for the rentiers/billionaires
- Organisations try to mitigate issues of inequality/injustice

- Focus on the land-justice-climate nexus will determine our collective future

Day 2, session C – Medium Term Responses

9. Adapting small scale spatial context in neighbourhood design, East Cape

Dr Deborah Robertson-Andersson W Ovens and Dr JM Stone University of Kwazulu-Natal S.A

- Climate change models – even when downscaled, do not describe real impacts based on geographical features
- Communities intuitively understand microclimate
- Difficult to put “numbers” to microclimate impacts e.g. temperature, or microclimate effects on settlement and work environments
- Microclimate topography - There can be differences of up to 4°C in less than 10m in near surface temperatures*. Slopes of 15 – 45° are hotter by 7°C.
- Buildings in the same area can be up to 9°C hotter due to topography induced microclimate (disregarding ecological influences- shade, albedo, etc.).

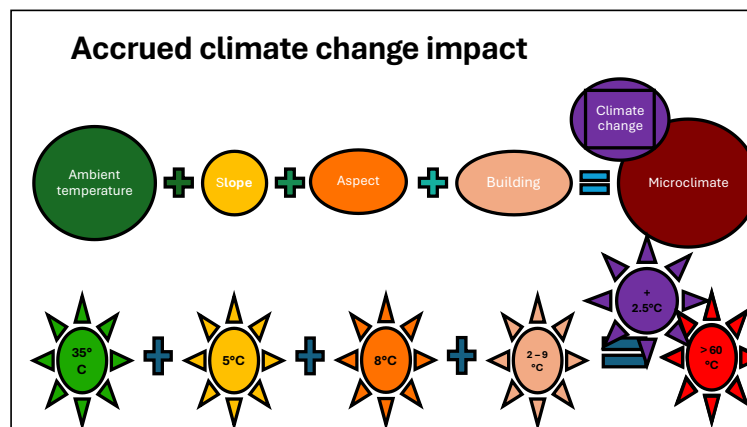


Figure 4 – Accrued climate change impact

- Traditional rural development has followed cooler microclimates. New developments and land invasions are moving to warmer areas. Cattle are shifting grazing to cooler areas with a resultant increase in car accidents
- Traditional vs newer construction:



Figure 5 – Traditional vs newer construction methods

Recommendations:

- Where you work and live needs to be future proofed - Layout and spatial design of human settlements need to be future proofed considering impact of topography induced microclimate and climate change.
- Architecture, design and construction should consider impact of microclimate and topography.
- Consider - Cooling features of buildings, building styles and materials used, and landscaping and ecological influences.
- In undertaking spatial design analysis, climate change impact assessment along with microclimate analysis needs to be done as a first step in working towards creating liveable and resilient communities.

10. Multisectoral preventive services: A retrospective policy analysis model for local government (Developing good practice and sound policy)

Dr Mike Agenbag, Faculty of Applied Sciences, Cape Peninsula University of Technology

- Public policies - perceived as tool for keeping society's essential needs central - in practice lack of integration of legal mandates, systemic incongruencies, lack of communication and collaboration.
- ADEPT (Analysis of determinants of policy impact) forms a retrospective policy analysis tool to help identify systemic incongruencies, navigate decision biases, consider factors influencing policy output and outcomes. Adapted model incorporates fundamentals for service delivery:

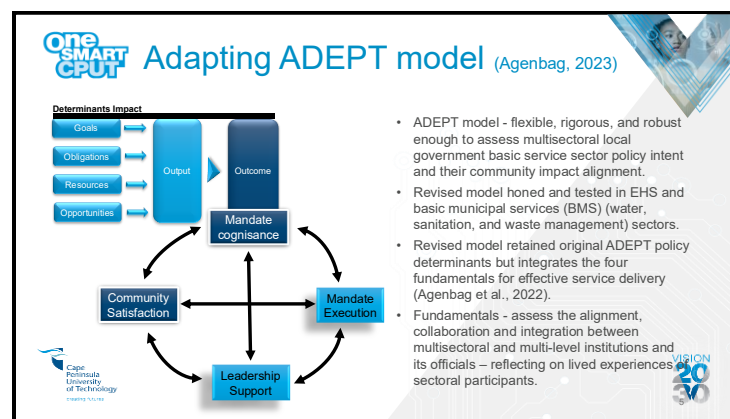


Figure 6 – ADEPT retrospective policy analysis tool

- Intersectional collaboration – Policies are not explicitly requiring sectoral departments to collaborate with municipalities, or national and provincial health departments (one example of findings in this area)
- Resources – Organisational capacity - Sectoral departments typically reactive planning approach, excluding EHS in the early planning stages (one example of findings in this area)

Recommendations:

- ADEPT model considers goals, obligations, resources, and opportunities - effectively identifies misalignments between multisectoral policy intent, practice and decision biases.

- Offers a systematic approach to uncover procedural and relational inconsistencies in multisectoral policies and government arrangements.
- Policymakers - use ADEPT approach to design 'evidence-informed' policies - promote integrative, collaborative planning across sectors, leading to sustainable preventive health outcomes.
- Programme managers - identify and overcome implementation barriers.
- Researchers - assess policy effectiveness and suggest improvements.

11. Disability, extreme weather and climate resilient housing, UK

Dr Sarah Bell and Andy Shipley Exeter University

- Sensing climate – a five-year programme of collaborative research:
 - 1 - Rights: How disabled people are positioned within climate law and policy
 - 2 - Experiences and adaptive responses to climate change
 - 3- Informing Change - Towards disability-inclusive climate adaptation (based on 1 and 2 findings)
- Rights - Analysis of key policies, analysis of key legal documents and frameworks, key informant interviews, consultation responses etc
- Experiences - Themed cuppa & chat sessions, interviews, murals, creative writing workshops

Recommendations:

- Housing must be accessible, flood resilient and at a safe level of thermal comfort
- Resource is needed for greater collaboration with DPOs to identify the homes of disabled people whose health is most at risk from climate impacts
- Energy efficiency and climate resilience measures must not compromise key accessibility features
- Co-production of emergency preparedness plans with DPOs is essential
- Need to 'build forward better' after extreme weather events

12. Green urban regeneration, economic and environmental impacts (based on case study of West Bromwich, UK)

Dr Charles Goode, University of Birmingham

- Urban greening project – West Bromwich, UK
- £1.22m Capital and Revenue Funding from £25m funding from the Department for Levelling Up's Towns Fund. Work began on site in November 2022 and will run to March 2026 (majority of work complete). The first phase involved the placing of parklets in West Bromwich High Street and the planting of Winter Cherry Blossom trees. The second phase involves the planting of Hornbeam and Canadian Maple trees and a wildflower meadow on Walsall Street. This forms an important part of the 'city living' strategy in the West Bromwich Town Centre Masterplan.
- Alongside this £10k from Impact Acceleration Account for an interdisciplinary project to evaluate the environmental impacts of urban greening initiatives in West Bromwich including the effects on air quality, surface water runoff and urban temperature. To cross-tabulate and evaluate these with social impacts to human health and wellbeing including on dwell

time, place perception and attachment, local spend and footfall. Developing important lessons and best practice for local and national policy.

- Biological data - Soil quality monitoring, leaf length and width of the young trees and trunk diameter (ongoing), thermal imaging, air quality measurement (CO₂, particulate matter (PM) levels), windspeed, urban temperature, considered surface water runoff.
- Social science data - Place perception questionnaire, student quiz on West Bromwich site visit, participant observation, engagement with local business and interviews with stakeholders

Recommendations:

- Securing Central Government funding relies upon transformative change and effectively linking greenspace intervention to broader local priorities and strategic objectives
- Urban greening of itself is insufficient to deliver economic revitalisation but it is very important in creating a more attractive urban environment which is essential to support city living
- Even a relatively small-scale intervention/study demonstrates some impact on urban temperature and air pollution although longer-term measurements and studies are needed
- There is sometimes a trade-off between environmental and social benefits, e.g. parklets

Day 2, session D – Longer term responses

13. Community-led planning for climate emergency resilient planning (case study for shack dwellers)

Hendrina Shuunyumi, The Namibia Housing Action Group (NHAG) and the Shack Dwellers Federation of Namibia (SDFN)

- SDFN is a network of community-based savings groups working towards secure housing for low-income families and NHAG provides technical support, capacity building, and advocacy.
- Post-independence rural-to-urban migration led to rapid informal settlement growth. Over 40% of Namibia's population and 80% of its urban residents live in informal settlements. Many are excluded from credit-linked housing opportunities.
- Challenges faced by shack dwellers - Inadequate housing and lack of basic services (water, sanitation, electricity), vulnerability to climate change, including floods, droughts, and extreme weather events, economic constraints and limited access to financing, land tenure insecurity and urban expansion pressures.
- A pivotal moment in 2013: Gobabis Municipality signed an MoU with NHAG, leading to one of Namibia's largest informal settlement upgrading projects (1,000+ households). Expanded to 10 regions, 27 urban areas, and 47 informal settlements.
- Strategies used for building community resilience:
 - A. Community-Led Housing Development - savings groups foster self-reliance, collective decision-making and participatory planning.

B. Secure Tenure and Land Acquisition - negotiating land tenure rights, government partnerships to facilitate land access.

C. Climate-Resilient Housing Design -climate-adaptive construction (e.g., flood-resistant structures), use of affordable, sustainable building materials, design considerations: North-facing windows, hollow block production, eco-friendly layouts.

- D. Strengthening Livelihoods and Economic Empowerment -skills training (e.g., backyard gardening, construction, business development), women and youth involvement in housing initiatives, access to micro-financing for housing improvements.
- E. Partnerships and Policy Advocacy -collaboration with local authorities, NGOs, and international agencies, policy engagement for pro-poor housing strategies, mobilizing financial and technical support.
- Activities implemented - Community Land Information Programme: Inclusive planning, flexible Land Tenure Act, strengthened land tenure security, service and infrastructure improvements: Pegging, surveying, water and sanitation installations.
- Capacity building: Community training in housing upgrades.
- Housing loans: Administered via the Twahangana Fund.

Recommendations:

- Expand to upgraded land in order to build more houses
- Strengthen negotiations with development agencies and government for direct contributions to the Twahangana Fund.
- All within the scope of UN-Habitat's informal settlement upgrading strategy from the Participatory Slum Upgrading Programme (PSUP).

14. Health planning and well-insulated housing (using health modelling to evaluate future medical expenditure on insulated housing)

Dr Wataru Umishio et al, Institute of Science, Tokyo, Japan

- Core question of the study – is it beneficial to invest more in insulation or heating?
- Health Japan 21, the country's key health policy, the goal is to prevent cardiovascular diseases by lowering blood pressure through lifestyle improvements.
- Japan's Smart Wellness Housing Survey shows that living in a warmer environment has been shown to lower blood pressure, with a particularly significant reduction observed among high-risk elderly individuals.
- Examined whether incorporating the health benefits could make the investment in insulation financially viable. This then becomes a basis for decision-making when constructing new homes or renovating existing ones, allowing homeowners to assess the long-term benefits to health.
- The model uniquely utilises health economics - This method is typically used when developing a new drug, where its cost and effectiveness are evaluated to determine whether it is a viable medical treatment. First global study of its kind.

- Three cases selected for analysis - 1. Grade 2 home with 15°C (1980 standard), 2. Grade 4 home with 18°C (1992 standard), 3. Grade 6 home with 21°C (1999 standard).
- TreeAge Pro, a specialized software commonly used in the field of health economics used for modelling. The predictions were based on a baseline of predicted rises in blood pressure over time without addition of insulation or heating.
- Found a clear reduction in medical expenses, especially for hypertension-related treatments, medical costs for cerebrovascular disease and heart decreased.

Recommendations:

- Upgrading insulation and living in a warm house at the time of new construction increases lifetime costs but extends healthy life expectancy, making it cost-effective
- Upgrading insulation during renovations also proved to be cost-effective. However, full-home insulation retrofits—as assumed in this study—incur high costs. Therefore, lower-cost alternatives, such as partial insulation retrofit focused on frequently used rooms, may be an even more effective approach.

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15. **Building resilience – AKAH transformative approach to safe housing in Pakistan**

Nusrat Nasab, Aga Khan Agency for Habitat, Pakistan

- Pakistan's vulnerability to earthquakes, floods, and other climate induced hazards, housing challenges in mountainous and flood-prone regions. Need for resilient, community-driven solutions for Safe Housing in Pakistan. Over 60% of Pakistan's population lives in rural areas, where housing is often poorly constructed and vulnerable to disasters.
- The 2005 Kashmir earthquake killed over 73,000 people and left 3.5 million homeless, highlighting the urgent need for disaster-resilient housing.
- Floods in 2022 affected 33 million people, destroyed 1.7 million homes, and caused over \$30 billion in economic losses.
- Net Zero Carbon Emission 2030 – AKDN Green Construction Standards including green retrofit and energy efficiency & First EDGE Gold certified building in Pakistan
- Strong investments in improving habitat, for public assets and the most vulnerable households. +5000, resilience building solutions including early warning systems; preparedness/Community Emergency Response Team as first responders (50% women), protective infrastructures, shelters/Prefab homes and stockpiles for disaster affected communities
- Installation of 600 clean drinking water supply schemes and sanitation benefiting 500,000 people through community centric approach and public private partnership
- Planted over 45 million trees for fuel wood, fodder and construction
- +28 Megawatt of clean energy provided through hydro and solar solutions with plans to generate an additional +60 MW in the future

- Empowering Communities Through Resilient & Sustainable Housing in Changing Climate – Hazard vulnerability and Risk Assessments on settlements, technical support for resilient housing, community-based disaster preparedness.

Recommendations:

- Structural Resilience & Sustainability
Seismically Resilient Structure – Designed for earthquake-prone regions
Green Construction – IFC-EDGE Certified, reducing carbon footprint
Stabilized Mud Flooring – Enhances thermal comfort and durability
- Energy Efficiency & Climate Adaptation
Hybrid Design – Integrates fuel-efficient features (e.g., Bukhari stove for heating & cooking)
Thermally Comfortable Design – Uses vernacular architecture for insulation
Use of Local & Sustainable Materials – Low environmental impact
- Liveability & Community Needs
Future-Proof Design – Allows for future extensions
Space for Storage – Firewood, fodder, and essentials
Communal Infrastructure – Water supply, sanitation, street infrastructure, electricity
- Socio-Economic Empowerment
Housing Finance (MFIs) – Supports affordability and accessibility
Skill Development & Vocational Training – Capacity building for local builders
Community Participation – Engaging locals in construction and decision-making

16. Flood resilience in Nigeria's lower Niger region

Dr Cyril Effiong, University of Birmingham

- Research Focus: Examining adaptation strategies at national, community, and household levels. Frameworks Used: Sustainable Livelihoods and Political Economy
- Objective: Understand how structural factors, community-driven efforts, and household-level strategies help farmers adapt to flooding.
- Key Issue: Extreme flooding threatens farmers' livelihoods and community stability with vulnerabilities of poor infrastructure, governance issues, socio-economic disparities. Significant impacts on agriculture, housing, health, and community well-being.
- Mixed-Method Approach: Quantitative: 198 participants (farmers, community leaders, policymakers), Qualitative: 22 Interviews & 2 Focus group discussions.
- Governance and structural challenges - Governance Issues: Corruption, bureaucratic inefficiencies, lack of policy coherence, inequitable resource Distribution: 62% of respondents identified corruption as a major issue and 73% of smallholder farmers had limited access to government resources. Gender Disparities: Women face exclusion from decision-making processes.
- Community driven adaptation - Indigenous flood prediction methods (e.g., animal behaviours, river changes), cooperative Resource Management:

Shared irrigation systems, bamboo embankments, early warning systems, inclusion challenges for women and landless farmers, inclusivity in community-based programmes.

- Household level adaptation – adaptive practices (crop diversification, flood resistant infrastructure), social networks (informal credit systems, resource sharing)
- Challenges to adaptive practice - Financial constraints limit widespread adoption of adaptive measures. Gender and land ownership issues exacerbate inequalities.

Recommendations:

- Governance reforms - Prioritize transparent disaster risk reduction (DRR) policies and address corruption and ensure equitable access to resources.
- Community support - Enhance support for cooperative societies and local adaptation efforts. Provide targeted assistance for marginalized groups (women, landless farmers).
- Household resilience - Expand microfinance programs and credit facilities for smallholder farmers. Strengthen social safety nets during and after floods.
- Multi-scale approach - Align local strategies with national development frameworks, integrate adaptation strategies into broader climate resilience policies.
- Partnerships - Foster collaboration between public, private, and non-governmental sectors.
- Education and capacity building - Invest in climate awareness and farmer education

Day 2, session E – Prevention and Preparation

17. Mitigation and adaption for resilient and healthy homes – what the research says

Drs Kate Simpson and Angela Connelly, Centre for Sustainable Construction and Retrofit, Nottingham Trent University and Manchester School of Architecture, Manchester Metropolitan University

- Systematic mapping of the literature on retrofit and future overheating, covers UK-relevant papers (based on similar climate types and policy environment)
- Research Question: what is known within the built environment disciplines about retrofitting UK properties for energy efficiency and climate adaptation to flooding and heatwaves? Sub-question: to what extent to studies consider future overheating and future flood risk?
- Results – majority of studies include overheating, UK based studies primarily in London and the Southeast, most studies quantitative (86%) based on modelled data, most studies (83%) are on residential buildings, insulation dominates in terms of considered measures.
- Results – 61% of studies included climate projections on future overheating.
- Mitigation and adaptation strategies are not always considered together in a holistic way when we examine retrofit.

- Question marks over the consideration of future weather extremes rather than typical weather patterns.

Recommendations:

- The literature shows that IWI (internal wall insulation) needs to be handled with care as it is the most linked intervention to future overheating.
- Few studies include a consideration of typical energy efficiency retrofit measures (e.g. insulation) with passive cooling techniques, behavioural adaptations, the role of vegetation. (c.f. Makantasi & Mavrogianni, 2016; Zahiri & Gupta, 2023).
- More qualitative studies are needed to examine how people use buildings, what kind of adaptations are made, if they perceive a benefit from adaptation measures and how they experience extreme weather events.
- Occupancy profiles are typically modelled and usually consider older people, as they are more vulnerable to overheating, or a working family. However, these models use assumptions which may or may not reflect reality, e.g. more recent working from home practices.

18. Prefabricated tiny house construction, Izmir, Turkey

Professor Ahenk Yilmaz et al, Department of Architecture, University and University of Plymouth



Figure 7 - Tiny House Example, Izmir, Turkey

- Utilises modern methods of construction: bio-based, zero-carbon, energy positive, healthy and resilient and considers circular economy.
- Includes consideration of material provenance and manufacturing information, transport and embodied carbon data, deployment, assembly and ownership information.
- 2020 Aegean sea earthquake - epicentre was located about 14 km northeast of the Greek island of Samos, but the city of İzmir in Turkey, approximately 70 km away, was heavily affected, resulting in significant damage to over 700 buildings. The powerful quake was followed up by a small tsunami that sent water gushing into the Seferisar district of Izmir. Collapsed buildings.
- Need to consider resilient and sustainable reconstruction and manufacturing.
- Research ongoing – Woodlab - including re-used wikihouse blocks, recycled windows and doors, natural fleece (sheep's wool) and larch rainscreen.

Recommendations:

Design for manufacture and Assembly factory types:

- Local Workshop - Utilises latent capacity, existing local infrastructure, no setup costs, widely scalable but knowledge gap with some training and onboarding needed
- Mobile 'flying factory' - Consistent setup & hardware, located on site, low overheads, specialist team, initial CapEx and relocation costs, some site and access limitations
- Community hub - Initial setup and rental overhead, rooted in local community, education and skills base, social and economic benefits, reliant on grant funding

19. Light technology and health protection

Dr Helen Onyeaka and Dr Taghi Miri, University of Birmingham in partnership with Biovitae (Martin Curran)

- The rise of drug-resistant pathogens is a significant threat to human and animal health, agriculture, and food security.
- In 2023, 5% of dwellings in England had a problem with damp, higher than in any of the last five years (3-4%).
- Approximately 3% of flats and homes across the UK are classified as having damp issues, with higher prevalence in certain ethnic groups and rented accommodations
- Health Risks: 21% of asthma cases linked to mould exposure. causes respiratory issues, allergic reactions, and infections.
- Study assessed the use of Biovitae LED in reducing mould contamination
- A series of experiments to evaluate the effectiveness of Biovitae visible light against several food pathogens, including *Listeria monocytogenes*, *Escherichia coli*, and *Bacillus cereus*
- *Listeria monocytogenes* populations were significantly reduced under Biovitae light treatment compared to fluorescent light.
- Mould deactivation – results showed significant reduction with progressive increase in effectiveness on spores with time.

Recommendations:

- Demonstrates real world applications for Biovitae light technology in hygiene and sanitation
- Further studies can explore optimization for different environments

20. Mitigating risk from urban heat islands

Richard Flemmings CEO, Map Impact

- Environmental data products can help support understanding of nature and climate risk
- 53% more land needed by 2050, 36% of housing stock will soon be at risk of overheating
- Dense urban areas can be 8°C hotter than surrounding regions
- Provides a satellite technology opportunity:

- Map Impact - 3-year rolling temporal window consisting of 18 features within the following thematical groups:
Land Surface Temperature and its Spatial-Temporal Distribution
Day/Night Temperature Differences
Green/Built-Up Temperature Differences
Cooling Factors
- Main sources of information: Landsat-8/9, Sentinel-2, MODIS, Day/Night Imagery Series, BiodiversityView™, Habitat Map
- Case examples of Birmingham and Livv Housing Group Liverpool.

Recommendations:

- Use for example wildfires: Combining knowledge of historic wildfires with wide-ranging environmental data to inform risk score. Integrating susceptibility, meteorological conditions, vegetation condition and spatiotemporal distribution
Use for example drought: Combining vegetation health, temperature, precipitation, moisture and landcover. Providing susceptibility to drought through combination of known methodologies.

21. National housing insulation retrofit survey, Japan

Prof Toshiharu Ikaga, Keio University, Japan

- Premise: If highly insulated houses had become more common earlier, could have prevented deaths from winter disease, domestic deaths (such as falling, number of indoor heat strokes).
- WHO guidelines – winter room air temperature should be 18 degrees C or higher,

Japan 21 policy - active collaboration is necessary with initiatives in the fields of Building and housing.

- SMART Wellness Housing Promotion Research project, since 2014
- 14 medical original articles, in areas of indoor air temperature, home blood pressure, health checkups, diseases and symptoms, physical activity and health economic evaluation
- Findings *include*:
- 90% of homes in Japan have indoor temperature below the WHO recommended 18 °C and the lower indoor temperature in a warm climate area (Indoor Air 2020)
- Warmer homes reduce blood pressure for elderly and women
- Blood pressure is significantly reduced by insulation retrofit
- Below 18 degrees health check results are significantly worse.
- Warm homes could reduce falls in homes
- Hypertension and cardiovascular disease are life-environment diseases
- In homes where the room temperature in the living room and dressing room had increased after insulation renovation, the number of people taking dangerously hot and long baths was significantly reduced.

Recommendation:

- Insulation retrofit could reduce diseases and injuries after 5 years

Day 3 Future Proofing

1. Dr Angie Bone, Associate Professor, Monash University

Planetary health and housing: challenges and pathways for resilience and sustainability

- Key challenges:
 - Conceptual – how we think and what we value
 - Knowledge – how we learn and how we know
 - Governance – how we organise and how we decide
- System leverage points (Donella Meadow) – places to intervene in a system
- Sources of power and frameworks of persuasion

Recommendations:

- Measuring what matters - across policy, practice, education and research, bridging silos and improving outcomes over the long-term
- Engaging communities – participation and involvement in decision-making and advocacy, including groups that are seldom-heard
- Evidence and innovation – solution-focused, transdisciplinary, emergent and impactful from multiple perspectives (win-wins), measure what matters
- Policy and regulation – building standards, zoning regulations, land-use, and enforcement, taking a long-term view
- Investment and fiscal incentives - for healthy, sustainable and resilient homes, with particular focus on justice and equity

Suggestions for personal action:

- Use the most appropriate entry points to change for your context; use your power to question and challenge the status quo
- Find and use points for leverage – aim for changes to system structure and mindsets; recognise the potential of lower order change
- Establish ‘what good looks like’ and what will help you get there
- Explore who needs to do what differently, and think broadly about who needs to be involved in the change
- Understand drivers of behaviours and make change easy
- Create wide bridges and social networks, support early adopters

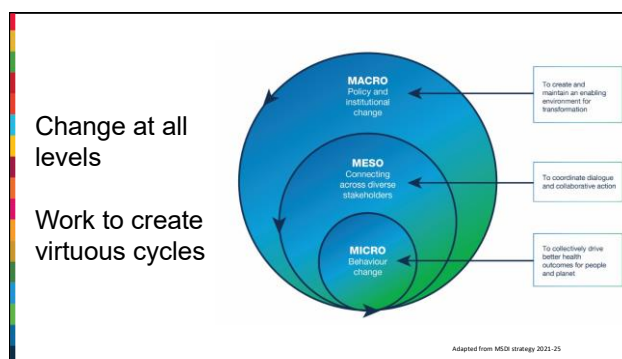


Figure 8 system leverage levels

2. Professor Caradee Wright Chief Specialist Scientist: Environment and Health Research Unit, South African Medical Council

Future proofing dwellings in Africa

- Climate change poses significant health risks, particularly in low- and middle-income countries (LMICs) where rising temperatures exacerbate existing vulnerabilities
- Work to document findings from as many articles as possible for studies that measured and reported measured indoor temperatures in houses in African countries.
- Studies in LMICs in Africa show that temperatures are projected to increase by 2100, emphasising the urgent need for future-proofed housing to protect residents from heat-related illnesses.
- For example, in South Africa in rural Limpopo province, indoor apparent temperatures (AT) already exceed 40°C in summer and 35°C in spring. Similar trends were observed in urban Johannesburg.
- Dwellings with indoor temperatures that mimic outdoor temperatures, such as iron shacks or cardboard structures, do not provide adequate thermal comfort or protect against adverse health impacts (Mabuya and Scholes, 2020)
- To mitigate these risks, future-proofing strategies for LMIC dwellings should prioritize thermal comfort. Insulation installation, adequate ventilation through windows or air conditioning, and the use of green roofs and double-glazed windows are crucial.

Recommendation:

- A multi-faceted approach incorporating sustainable building practices, community heat-health awareness campaigns, and targeted interventions for vulnerable populations to ensure healthy and resilient housing in the face of climate change.
- LMICs must look at their housing policies and how to improve dwellings with respect to protection from global warming

3. **Dr Marilyn Black Vice President and Senior Technical Advisor, Chemical Insights Research Institute of UL Research Institutes**

Building Resilience for Health: A public health perspective on climate impacts

- In today's complex risk environment, the past is no longer a reliable guide to the future.
- Need to shift from reactive to proactive action and think about long term as well as short term risks to health
- Need to consider the inside of the building as much as we consider the outside

- Internal building stressors include chemicals, moulds, particulate matter, temperature, humidity, dust and biological agents.
- Even if there is no outside damage, building materials can behave differently in extreme events, leading to for example poor air quality, poor water quality
- Opportunity to seek out more resilient alternatives
- Consideration of most vulnerable communities needed.
- Key findings from research: 78% of the tested materials demonstrated increased emissions at higher temperatures. Four of the materials with significantly increased emissions were labelled as “low-VOC.” Some emissions, such as formaldehyde, have associated health and indoor air quality risks. Some materials introduced new chemicals at the elevated temperature.
- Wildfires – In addition to vegetation, it’s also burning manmade materials like buildings (and the contents inside) and vehicles, leading to release chemical elements and materials of concern, such as halogens, plastics, and metals, exist in much higher concentrations in the WUI, resulting in different emissions, exposure outcomes, and health effects – effects are wide with cost to health and economic costs.

Recommendations:

- Safer products using alternative formulations
- Updates to third party programs
- Designing for the “new normal”
- New approaches to managing ventilation

8. Summary of Conference top level findings:

The findings from the conference fall into the following main areas:

1. Professional responses to extreme events are siloed and fragmented in the fields of academia, government and policy making.
2. Evidence that upstream investment in healthy housing saves downstream health costs is rarely factored in by policy makers.
3. Lessons learned from previous emergency events are often not implemented.
4. The global south is often viewed by high income countries primarily as a recipient of top-down assistance, not respected for its indigenous knowledge.
5. Groups low in power hierarchies in all countries are under-represented in decision making for emergency event preparedness and resilience.
6. Colonisation and mass urbanisation created a legacy of housing poorly adapted to climate change.
7. ‘Temporary’ housing is often, effectively, permanent. Too often it is unhealthy and culturally insensitive.

9. Summary of top-level recommendations:

Arising from the findings outlined above, the key recommendations emerging are:

1. Horizontal and vertical communication should be fostered between professional disciplines and national and local government services.
2. Health should be better integrated as a cross-cutting theme of planning.
3. Lessons should be learned from previous emergency events and shared.
4. International 'equal status' communication and knowledge sharing should be facilitated.
5. Marginalised and under-represented groups should participate in decision making.
6. Traditional, indigenous design (or modern design adopting its materials and principles) is the most in tune with nature and biodiversity and favourable to climate change.
7. Technological solutions on affordable and healthy post-emergency event housing and solutions for potable water, sanitation and safe food storage, often developed in universities, should be shared.

The conference itself was a notable exercise in knowledge sharing and building an evidence base. It has created a valuable international community of academics and practitioners with many participants crossing both fields, which can be built upon.

Appendix 1 – International Advisory Group and steering committee members

International Advisory Group:

Dr Mike Agenbag, Cape Peninsula University of Technology, South Africa

Prof. Emma Baker, Adelaide University, Australia

Dr Angie Bone, Monash Sustainable Development Institute, Victoria, Australia

Dr Marilyn Black – Chemical Insights Research Institute

Dr Veronique Ezratty, Service des Etudes Medicales, EDF, Paris, France

Prof. Edet Ikurekong, University of Uyo, Nigeria

Prof Philippa Howden-Chapman, University of Ontago, New Zealand

Dr David Jacobs, National Center for Healthy Housing, U.S.

Prof. Taibat Lawanson, University of Lagos, Nigeria

Dr. Andrew Mathieson, Australian National University

Prof. Caradee Wright, South African Medical Research Council

Dr Temilola Oluseyi, University of Lagos, Nigeria

Dr Helen Onyeaka, BISCA, University of Birmingham

Carl Petrokofsky, FFPH, Consultant in Public Health, Extreme Events and Health Protection, Centre for Climate and Health Security, UK Health Security Agency

Dr Nathalie Roebell, WHO, Urban Health lead

Prof. Toshiharu Ikaga, Keio University, Tokyo, Japan

Dr Richard Turkington, Healthier Housing Partnership, Housing Vision (Chair)

Steering Committee:

Zena Lynch, Healthier Housing Partnership (Associate Prof (Hon), University of Birmingham) (chair)

Dr Richard Turkington, Healthier Housing Partnership

Gill Leng, Healthier Housing Partnership

Liz Webster, Healthier Housing Partnership

Bob Young, Healthier Housing Partnership

Cyril Effiong, Healthier Housing Partnership

Lilian Wahome, Healthier Housing Partnership

Dr Steve Battersby, Healthier Housing Partnership

Prof. David Ormandy, Healthier Housing Partnership

Rosemary McMahon and Karen Hobson, London Professional Briefings

Appendix 2 – List of conference sponsors

Thanks to the following sponsors without which the conference would not have been possible:

Biovitae (Martin Curran)

Birmingham Institute for Sustainability and Climate Action (Professor David Hannah)

Chemical Insights Research Institute of UL Research Institutes (Dr Marylin Black - Vice President and Senior Technical Advisor)

Routledge (Ed Needle)

UKHSA (Carl Petrosfsky and Paul Coleman)

Appendix 3 - List of Speakers

Day 1 keynote speakers

1. Prof. David Hannah, UNESCO Chair of Water Science, Director of Birmingham Institute for Sustainability and Climate Action
2. Dr David Jacobs, Chief Scientist, US National Center for Healthy Housing
3. Dr Nathalie Roebbel, Lead on Urban Health, World Health Organization
4. Prof. Paloma Taltavull de la Paz, Department of Applied Economics, University of Alicante.
5. Dr Michael Agenbag, Senior Lecturer/Community Service Co-ordinator (Environmental Health), Cape Peninsula University of Technology

Day 2

Parallel session A:

6. Catherine Feeney, Project Lead – Western Australia Local Government Arrangement)
7. Wayne Neate, Director of Infrastructure, West Kimberley, Australia
8. Dr Surindar Dhesi, University of Birmingham
9. Muhammad Nasir, University of Georgia
10. Regina Opondo, DARAJA, Resurgence, Kenya and Tanzania
11. Guido Martinez, Emergency and Climate Change Coordinator, Ministry of Health, Chile
12. Cárcamo, A Gútierrez, Ministerial Secretary of Health Biobio Region

Parallel session B:

13. Dr Jamila Wakawa Zanna, University of Birmingham
14. Dr Ang Li, NHMRC Centre of Research and Excellence in Healthy Housing, University of Melbourne
15. Rebecca Bentley, NHMRC Centre of Research and Excellence in Healthy Housing, University of Melbourne
16. Paul Coleman, UKHSA Extreme Events and Health Protection Unit
17. Dr Lee Towers School of Social Science Teesside University
18. Dr Anna Cronin de Chavez, Exeter University

Parallel session C:

- 19. Dr Deborah Robertson-Andersson, University of Kwazulu-Natal S.A
- 20. W Ovens, University of Kwazulu-Natal S.A
- 21. Dr JM Stone, University of Kwazulu-Natal S.A
- 22. Dr Mike Agenbag, Faculty of Applied Sciences, Cape Peninsula University of Technology
- 23. Dr Sarah Bell, Exeter University
- 24. Andy Shipley, Exeter University
- 25. Dr Charles Goode, University of Birmingham

Parallel session D

- 26. Hendrina Shuunyumi, The Namibia Housing Action Group (NHAG) and the Shack Dwellers Federation of Namibia (SDFN)
- 27. Dr Wataru Umishio, Institute of Science, Tokyo, Japan
- 28. Nusrat Nasab, Aga Khan Agency for Habitat, Pakistan
- 29. Dr Cyril Effiong, University of Birmingham

Parallel session E

- 30. Drs Kate Simpson, Centre for Sustainable Construction and Retrofit, Nottingham Trent University
- 31. Angela Connelly, Centre for Sustainable Construction and Retrofit, Nottingham Trent University
- 32. Professor Ahenk Yilmaz, Department of Architecture, Yasar University and University of Plymouth
- 33. Dr Helen Onyeaka, University of Birmingham in partnership with Biovitae
- 34. Taghi Miri, University of Birmingham in partnership with Biovitae
- 35. Richard Flemmings CEO, Map Impact
- 36. Prof Toshiharu Ikaga, Keio University, Japan

Day 3 keynote speakers

- 37. Dr Angie Bone, Associate Professor, Monash University
- 38. Professor Caradee Wright Chief Specialist Scientist: Environment and Health Research Unit, South African Medical Council
- 39. Dr Marilyn Black Vice President and Senior Technical Advisor, Chemical Insights Research Institute of UL Research Institutes

Appendix 4 – List of submitted papers

1. Development of a health economic model for living in well-insulated warm houses to evaluate future medical expenditure and healthy life expectancy (Umishio W., Ikaga, T., Kazuomi K., Yoshihisa F., Naoki K., Masam., S, Shintaro A., Keigo S., Shizo M.)
2. Applying small-scale spatial context in neighbourhood design to minimise the impacts of extreme events (Robertson-Anderson, D., Ovens, W., Ston JM.)
3. Bridging policy and practice gaps: extreme events create opportunities to traverse psychological biases towards preventive actions (Agenbag, M.)
4. Health trajectories following climate extreme events among people with mental illness and effect heterogeneity by housing vulnerability (Lee A. and Bentley, R.)
5. Future-proofing dwellings in low- and middle-income countries: mitigating heat-related health risks in Africa (Wright C., Sheldon, A. and Bulani M.)
6. Health Emergency Operations Center: a Public Health Tool for Wildfire Response in Chile (Carcamo I, Guitierrez A., and Martinez G.)
7. Resilience in the Face of Flooding: Livelihood Strategies for Farmers in Nigeria's Lower Niger Region (Effiong,C.)
8. Displacement, Housing, and Health: Addressing the Needs of Vulnerable IDPs in Nigeria (Zanna J.)
9. Lessons from Community led adaptation to extreme weather events to protect health (Towers, L., Cronin de Chavaz A., Albes P., Butler C., Walker G., Cottom M., Bland E., de Vockt F., Adger N)
10. Evaluating Policy and Practice Alignment to Navigate Multisectoral Preventive Services: A Retrospective Analysis Model for Local Governments (Agenbag, M.)
11. Modern methods of construction for the social good: An investigation of technological adoption for prefabricated tiny house communities in Izmir, Türkiye (Velis Reyes A., Yilmaz A., Olmez D., Bakan O., Burke R., Carr A., Kizilorenli E., Morales-Beltran M., Pedernana M and Pericic L.)
12. Tackling Urban Heat Risk: A Case Study on Mitigating Urban Heat Island Effects for Healthier Communities (Flemming R., and Bains T.)